DEPARTMENT OF THE NAVY

COMMANDER SUBMARINE FORCE
UNITED STATES PACIFIC FLEET
BLDG 619
1430 MORTON STREET
PEARL HARBOR, HI 96860-4664

9010
Ser 453/ -061
FEB 14 2001

From: Commander, Submarine Force, U. S. Pacific Fleet
To: Investigating Officer

Subj: RESULTS OF INVESTIGATION INTO SENSOR OPERABILITY ON USS GREENEVILLE (SSN-772)

Encl: (1) COMSUBPAC ltr Ser 453/054 of 13 Feb 01, Test Plan Approval

1. The sensor systems on the USS GREENEVILLE (SSN-772) have been evaluated for operability. The test plan used to evaluate the systems is attached as enclosure (1). The evaluation boundaries were to determine the operability of the systems. Three classifications were utilized: "Operable", "Degraded" or "Out of Commission". The team performing the testing did not attempt to determine if the equipment was operated properly by the crew. Equipment that had minor deficiencies, but still functioned properly was evaluated as "Operable". Detailed discrepancies are noted in Enclosure (1). When possible, equipment evaluated as "Degraded" also has an estimate of the impact on the ability of the equipment to provide usable data. If the equipment was recognized as Out of Commission or Degraded prior to underway, that fact is noted in the table. The team did not evaluate measures taken by the ship to compensate for equipment that was recognized by the ship as Out of Commission or Degraded.

2. The following systems were tested with the specific results as noted:

Equipment Name	Status	Comments
Sonars		
High Frequency Array (Unit 1802 & CSDC)	Degraded	The ship identified this system as degraded and had submitted a work request for repair on 18 Dec 00. 18 of 60 staves are OOC.
AN/BQR-22A(EC-17) Spectrum Analyzer	Out of Commission	Monitor in Control was OOC 1 of 2 monitors in Sonar is OOC. The system has been tagged out for several weeks.
Acoustic Intercept Receiver WLR-9	Operable	Several hydrophones had bearing errors slightly higher than the required specification but detection frequency and SPL were in spec.
BSY-1 Spherical Array (Passive and Active)	Operable	47 of 1104 hydrophones are OOC or degraded (well within specification of < 110 OOC or degraded). All apertures are in specification. This condition would not be detected on pre-underway checks
Hull Array (Unit 1818)	Operable	Two apertures are degraded.
Remote Acoustic Communications Station (WQC-2 equivalent)	Operable	None

ENCLOSURE(43) 25

Subj: RESULTS OF INVESTIGATION INTO SENSOR OPERABILITY ON USS GREENEVILLE (SSN-772)

Equipment Name	Status	Comments
Sonars		
Tracking Receiver GPD-111	Operable	None
BSY-1 Sonar - CONN remote display (ASVDU)	Out of Commission	ASVDU display is blank
Optics/Electronics		
Type 18 Periscope (Number 2 scope)	Operable	Gyro stabilization is not functioning properly. The eyepiece does not maintain stable plane when rotated rapidly. Decreases ~ 8 degrees in elevation when rapidly rotated 360 degrees counterclockwise and increases ~ 8 degrees in elevation when rapidly rotated 360 degrees clockwise.
Type 2F Periscope (Number 1 scope)	Operable	None
AN/WLR-8 ESM/Early Warning Receiver	Degraded	Band 10 OOC; Band 5 is degraded. The band which would sense commercial surface search radar is functioning properly.
Navigation inputs		
EM Log	Operable	None
ESGN/WSN-2	Operable	All inputs to sensor systems (e.g. heading, speed, roll, pitch) functioned normally

3. The ship established the equipment lineup on the CONN specified by ship's operating instructions for ascent to periscope depth. All equipment available to the Officer of the Deck, except as noted above, was operable. The communications equipment between the CONN and Sonar functioned properly. RACS speaker and Early Warning Receiver speakers on the CONN were also tested SAT.

4. The interfaces between own ship's navigation systems and Fire Control and Sonar were tested SAT. The ability for Sonar to send tracker information to Fire Control was also tested SAT.

D. E. HUELLE
By direction

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9010
Ser 453/-054
FEB 13 2001

From: Commander Submarine Force, U.S. Pacific Fleet
To: Commanding Officer, USS GREENEVILLE (SSN 772)

Subj: TEST PLAN APPROVAL

Encl: (1) USS GREENEVILLE (SSN 772) External Sensor Inspection Test Plan

1. Enclosure (1) is approved and forwarded for use in conduct of an external sensor inspection scheduled for 13-14 Feb 2001.

D. E. HUELLE
By direction

Copy to:
COMSUBRON ONE
NSSC PEARL HARBOR HI (N7, N48)
FTSCPAC DET PEARL HARBOR HI (213PH)

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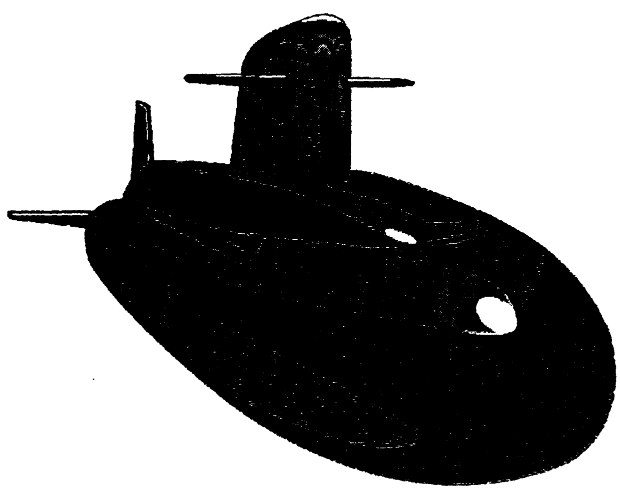
~~43~~ 4

TEST PLAN
To Determine
MATERIAL CONDITION OF EXTERNAL SHIP's SENSORS
13-14 FEBRUARY 2001

USS GREENEVILLE (SSN 772)



Enclosure ~~(1)~~ 2

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MATERIAL CONDITION INSPECTION OF USS GREENEVILLE (SSN 772) EXTERNAL SHIP'S SENSORS & INBOARD PROCESSING EQUIPMENT

TABLE OF CONTENTS

25
45

1.0 EXECUTIVE SUMMARY

This Test Plan was developed to determine the material condition of external sensors installed on USS GREENEVILLE (SSN 772). This plan is to be used by the Test Director and Team Leaders during the conduct of this inspection to ensure required testing is accomplish. This plan also serves as a guide to Ship's Force and Squadron/NSSC personnel in understanding the testing conducted. This plan contains element/unit, system, and end-to-end tests for the sensors associated with the following equipment: Sonar, Electronics Systems (ESM), Navigation and Fire Control/Combat Control

2.0 OBJECTIVES OF TESTING

The objective of this test are to determine and document the material condition of all relevant sensors on USS GREENEVILLE (SSN 772). No training will be conducted and no deficiencies will be corrected during this inspection.

3.0 RESPONSIBILITIES

The specific activity responsibilities are as follow:

A. **Type Commander (COMSUBPAC)**

1. Develop the test plan.

2. Forward the test plan to USS GREENEVILLE (SSN 772) under cover letter approving and authorizing use of the test plan.

3. Assign a test director to coordinate and collect results of the testing.

4. Conduct an inbrief and at the commencement of the inspection and an outbrief at the completion of the inspection.

B. **COMSUBRON ONE/Naval Submarine Support Command (NSSC)**

1. Attend the in-brief on-board USS GREENEVILLE on 13 Feb 2001.

2. Act as the central point of contact for coordination and direction of required services such as sail platform install, crane services, etc.

C. **USS GREENEVILLE**

1. Provide personnel as required to execute the test plan. Intentions are for ships force to operate equipment and inspection team observe. If necessary, inspection team members will request permission to operate equipment to meet inspection objectives.

D. **TEST DIRECTOR**

1. The Test Director is responsible for the actions of all personnel assigned to perform any part of the inspection.

2. The Test Director is responsible for the format, content and

4.0 TEST PROCEDURES

This procedure contains element/unit, system, and end-to-end tests to verify the operability of the following ships sensors and inboard processing equipment:

1) Acoustic/Sonar
2) Electronics Systems (ESM)
3) Navigation
4) Combat Control

Ship's sensors not covered by this test plan and not intended to be inspected:

1) BPS-15 Radar
2) TB-16/29 Towed Arrays

Completion of the testing is estimated to require 2 full days of testing. An active sonar window will be required during the second day of testing. Any test not completed by the end of day two will be completed ASAP on following days.

PROCEDURE DESCRIPTION:

Sonar/Acoustic Review (see Appendix A)

A system status of the Acoustics as well as system Fault Localization (FL) routines, operability procedures and unit level diagnostics are performed to determine the status of the systems. Testing that requires disassembly of cables or signal paths will be performed at the end of the test period. (e.g. transducer I/R checks, if required). All equipment tests will be conducted using MRCs, Operating Guidelines, ASW Test Procedures, and/or Technical Manuals.

Navigation Review (see Appendix B)

Dockside operability, transmission and interface testing of the ship's Navigational Systems will be performed. These tests will be conducted using MRCs, Operating Guidelines, and/or Technical Manuals.

Electronics Systems Review (see Appendix C)

Dockside operability, sensitivity, performance, interface and calibration testing of ship's Electronic Systems will be performed. These tests will be conducted using MRCs, Operating Guidelines, ASW Test Procedures, and Technical Manuals.

Fire Control Review (see Appendix D)

A system status of the CCS as it relates to reception of own ship's data and interface testing will be accomplished. The ability of the Fire Control System to interface with Navigation, Sonar and Periscopes inputs will be tested. Additional testing includes: TAC3/SFMPL interface to Fire Control/Sonar and TSS data receiver/transmit testing. All test will be accomplished in accordance with approved maintenance standards and/or Technical Manuals.

Ship Condition Requirements:

All ship service systems required to support operation of Forward Electronic Equipment and Periscopes must be operating normally.

Sail staging (racetrack) installed for day 2 of testing to support ESM testing.

Support Service Requirements:

Ship's Force minimum manning requirements: 2 FTs, 6 STs, 1 ESGN tech, 1 IC tech, 1 ESM tech, 1 Periscope tech

Ship's Force/NSSC coordinate Sonar sphere gas free if required (depends on results on Sonar NM/ASA testing MRC S-29R).

USS GREENEVILLE (SSN 772) / 13-14 FEB 2001 (SONAR)

SYSTEM	SUB-SYSTEM	MIP	PRE-UNDERWAY	MRC	MRs to accomplish	SAT/UNSAT	REMARKS
SONAR	WLR-9	4630/901-60	Y	R-1	1. WLR-9 Tracking Receiver Operability Test		
SONAR	WLR-9	4630/901-60	Y	R-3	WLR-9 Active Emission Receiver Processor Units 1068, 1120, 1121		
					1. Perform Display Test		
					2. Test Improved Control Indicator (ICI)		
					3. Perform Softkey test		
					4. Perform Spectrum test		
					5. Perform Bearing test		
					6. Perform Waveform test		
					7. Perform Narrowband Peak-to-Peak test		
SONAR	WLR-9	4630/901-60	Y	R-32D	WLR-9 Active Emission Receiver Processor Units 1068, 1120, 1121		
					1. Perform Rapid Operability Test		
SONAR	WLR-9	4630/901-60	N	M-21	WLR-9 Active Emission Receiver Processor Units 1068, 1120, 1121		
					1. Perfrom backup test		
					2. Perfrom lamp test		
					3. Perfrom assessment test		
					4. Perfrom Frequency Bearing Time (FBT) test		
					5. Perfrom Graphic History Test		
					6. Perfrom Tabular History Test		
					7. Perfrom Contact Mode Test		
					8. Perfrom Detection Waveform Test		
					9. Perfrom Detection Analysis Test		
					10. Perfrom Blanking Circuits Test		
					11. Perform Depth Monitor Circuits Test		
					12. Perform Bounds Function Test		
SONAR	WLR-9	4630/901-60	N	Q-17	WLR-9 Active Emission Receiver Processor Units 1068, 1120, 1121		
					1. Perform power monitor circuit test		
					2. Perform power control circuit test		
					3. Perform Audio System circuits test		
					4. Perform Threat and Torpedo band tests		
					5. Perform external elements blanking circuit test		
					6. Perform HF channel circuits test		
					7. Perform LF channel circuits test		
					8. Test Remote Indicator Unit 1121		
SONAR	RACS	4630/901-60	Y	R-6	Remote Acoustic Communication Stations (RACS) Units 1118/1119		
					1. Perform Unit 1118/1119 remote acoustic communications stand alone compatability test		
					2. Perform Unit 1118/1119 remote acoustic communications integrated operability test		
SONAR	CSDC	4630/901-60	Y	W-16R	Acoustic Equipment and Combat System Display Console (CSDC) Unit 1138		
					1. Perform CSDC unit 1138 FL parameters		
					2. Perform Graphic Visual test		
					3. Perform Power On Reset (POR) Pattern Visual test		
SONAR	MPC	4630/901-60	Y	R-11	Acoustic Equipment & Multi-Purpose Consoles (MPC) Units 1107/1108		
					1. Perform bottom sounding operability test		
					2. Perform top sounding operability test		

USS GREENEVILLE (SSI. . /2) / 13-14 FEB 2001 (SONAR)

SYSTEM	SUB-SYSTEM	MIP	PRE-UNDERWAY	MRC	MRs to accomplish	SAT/UNSAT	REMARKS
SONAR	ASC	4630/901-60	Y	R-4	Acoustic Support Console (ASC) Unit 1069		
					1. Conduct Acoustic Support Console Multiplexer (ASCM) Unit 1069A4 performance test		
SONAR	ASC	4630/901-60	Y	R-8	Acoustic Support Console (ASC) Unit 1069		
					1. Perform Unit 1069A2/A3 operability test		
SONAR	GPD 111	4630/901-60	Y	R-1	GPD-111 - Perform tracking receiver operability test		
SONAR	PBB	4630/901-60	Y	R-23	Acoustic Set		
					1. Perfrom passive broadband (PBB) operability test		
SONAR	SDD	4630/901-60	Y	R-26	Active Acoustic Equipment Ship's Data Display (SDD) Unit 3007		
					1. Perform Medium Frequency Active (MFA) operability test		
SONAR	SDD	4630/901-60	Y	R-27	Passive Acoustic Equipment Ship's Data Display (SDD) Unit 3007		
					1. Perform Passive Narrowband (PNB) operability test		
SONAR	SDD	4630/901-60	Y	R-29	Passive Acoustic Equipment Ship's Data Display (SDD) Unit 3007		
					1. Perform Sound Velocity Monitoring (SVM) operability test		
SONAR	SDD	4630/901-60	N	R-31	Passive Acoustic Equipment Ship's Data Display (SDD) Unit 3007		
					1. Perform Acoustic Test Target Insertion (ATTI)		
SONAR	SDD	4630/901-60	Y	R-34	Passive Acoustic Equipment Ship's Data Display (SDD) Unit 3007		
					1. Perform Noise Measurement/Auxiliary Spectral Analysis (NM/ASA) operability test		
SONAR	CSDC	4630/901-60	Y	R-28	Combat System Display Console (CSDC), Ship's Data Display Unit 3002		
					1. Perform HF/FWD operability test		
SONAR	ACOUSTIC SET	4630/901-60	Y	R-5	Acoustic Set		
					1. Perform bearing and range transmission test		
SONAR	OSDS	4630/901-60	Y	R-10	Weapons Control Console Unit 1113		
					1. Perform Own Ship's Data Set (OSDS) data confidence test		
SONAR	ICDC	4630/901-60	Y	M-1R	Improved Control Display Consoles (ICDC) Units 1103 & 1104		
					1. Test ICDC		
					2. Test ICDC indicators and controls		
SONAR	ICDC	4630/901-60	Y	M-2R	Improved Control Display Consoles (ICDC) Units 1103 & 1104		
					1. Test ICDC cursor alignment		
SONAR	HF ARRAY	4630/901-60	N	S-14R	Active Acoustic Equipment DT-633 (Unit 1802)		
					1. Perfrom HFA signal conditioner FLs.		
					2. Perform noise monitoring/auxilary spectral analysis (NM/ASA) visual verificationm test		
SONAR	ACTIVE	4630/901-60	N	Q-16R	Active Acoustic Equipment		
					1. Test Active subsystem control.		
					2. Test Active spherical transmission units (use "DOCKSIDE" option).		
					3. Test high frequency transmission units		
					5. Test high frequency transmission units (in port)		

25
43

USS GREENEVILLE (SS. /2) / 13-14 FEB 2001 (SONAR)

SYSTEM	SUB-SYSTEM	MIP	PRE-UNDERWAY	MRC	MRs to accomplish	SAT/UNSAT	REMARKS
SONAR	HULL ARRAY	4630/901-60	N	S-5R	DT-276 Hull Array Hydrophones Unit 1818		
					1. Measure insulation resistance, capacitance, and dissipation of individual hydrophones & cables using SMMS AN/BQQ-5 Hull Array Test Set and AN/BSY-1 LFA Test Set		
					2. Measure insulation resistance, capacitance, and dissipation of hydrophones staves and cables (without SMMS test sets).		
					3. Measure insulation resistance, capacitance, and dissipation of individual hydrophones and cables (without SMMS test sets).		
SONAR	SPHERE	4630/901-60	N	S-29R	Spherical Array Signal Conditioner Unit 1051 (SASC); NM/ASA		
					1. Print Passive Array Status		
					2. Perform Spherical Array Signal Conditioner Unit 1051 FL		
					3. Perfrom NM/ASA visual verification test for all rings		
SONAR	BQR-22A	SO-105/008-10	Y	R-4	BQR-22A		
					1. Perform diagnostic power-up sequence		
					2. Modify graphics		
					3. Perfrom confidence test		
					4. Perfrom hardware test		
					5. Perfrom X-Y plotter calibration		

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43

USS GREENEVILLE (SSN 7,_, / 13-14 FEB 2001 (NAVIGATION)

SYSTEM	SUB-SYSTEM	MIP	PRE-UNDERWAY	MRC	MRs to accomplish	SAT/UNSAT	REMARKS
ESGN	N/A	4271/R01-79	N	R-2	1. Conduct heading data transmission test		
					2. Conduct pitch data transmission test		
					3. Conduct roll data transmission test		
WSN-2	N/A	4261/004-60	N	R-2	1. Perform AN/WSN-2 angle transmission test		
IDU	N/A	4382/001-77	N	S-1	Perform off-line and on-line test of IDU output displays and indicators.		
EM LOG	N/A	IC-012/098-C8	N	S-1	Test operation of indicator transmitter		

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43

USS GREENEVILLE (SSN 77_, , 13-14 FEB 2001 (ELECTRONICS)

SYSTEM	SUB-SYSTEM	MIP	PRE-UNDERWAY	MRC	MRs to accomplish	SAT/UNSAT	REMARKS
TYPE 18	N/A	4251/R07-69	N	R-2	1. Test Periscope Operation		
TYPE 18	N/A	4251/R07-69	N	R-6	2. Schedule RF gain test by IMA. (SSEP will assist)		
ESM	WLR-8	4041/R05-79	N	R-1W	1. Perform system turn-on and self-test		
ESM	WLR-8	4041/R05-79	N	Q-1R	1. Conduct C-10209(P)/WLR-8 performance test		
					2. Conduct C-10208/WLR-8 performance test		
					3. Conduct IP-1140/WLR-8 performance test		
					4. Conduct IP-1141/WLR-8 performance test		
ESM	WLR-8	4041/R05-79	N	Q-4	1. Measure system tangential sensitivity		
ESM	WLR-8	4041/R05-79	N	Q-5R	1. Perform signal centering false alarm test.		
					2. Measure scan lock functional sensitivity.		
ESM	WLR-8	4041/R05-79	N	Q-7R	1. Measure HPI receiver minimum processable signal (MPS)		
ESM	WLR-8	4041/R05-79	N	A-2	1. Test pan sweep linearity.		
ESM	WLR-8	N/A	N	N/A	1. Perform Radiated Sensitivity Test (SSEP iaw SE400-B4-PRO-010 - SECRET)		end-to-end performance assesment

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43

USS GREENEVILLE (SSN 77_ 13-14 FEB 2001 (FIRE CONTROL)

SYSTEM	SUB-SYSTEM	MIP	PRE-UNDERWAY	MRC	MRs to accomplish	SAT/UNSAT	REMARKS
BSY-1	Combat Control	4630/901-60	N	Q-13	Own Ship's Data Interface Test		
					2. Perform own ship data reception test (in port)		
					3. Perform periscope transmission test and external benchmark test		
TYPE 2	SCOPE	N/A	N	N/A	1. Inspect operation of type 2F scope		
					2. Verify optical integrety of the periscope		
					3. Verify scope elevation and magnification funtion properly		
					4. Verify detent on elevation control is functional		
TYPE 18	SCOPE	N/A	N	N/A	1. Inspect operation of type 18 scope		
					2. Verify optical integrety of the periscope		
					3. Verify scope elevation and magnification funtion properly		
					4. Verify detent on elevation control is functional		
VARIOUS	MC/AUDIO	N/A	N	N/A	1. Verify Sonar Audio is audible on the CONN		Fire Control/Sonar/ESM/ET
					2. Verify open mike functioning properly		
					3. Verify MCs and open mike circuits between SONAR/ESM and CONN are functioning		
					4. Verify AUDIO is recorded on TASCAM recorder		
					5. Verify Early Warning Receiver functioning		
					6. Verify RACS/WQC-2 audible on CONN		
VARIOUS	GAGES	N/A	N	N/A	1. Compare digital and shallow water depth gages		

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43

From: LCDR D.W. Alldridge
To: CAPT(sel) K.R. Johnson

Subj: STATUS OF BSY-1 SPHERICAL ARRAY TRANSDUCER PENETRATOR REPLACEMENT

1. The following summarizes the replacement and status of spherical array transducer repairs on 4 SUBPAC platforms identified by CSP msg DTG 191250Z MAY 00 according ~~t~~ (b-3)(b-6) the COMSUBPAC Force Sonarman.
2. USS ~~Cheyenne~~ (SSN 772) Greenville
   - Initial failures: 237 prior to replacement
   - Replacement: 552 of 1104 CTC penetrators replaced
   - Current Status: 3 of 1104 CTC penetrators failed
3. USS Tucson (SSN 770)
   - Initial Failures: 365 prior to replacement
   - Replacement: All 365 bad CTCs replaced
   - Current Status: 47 of 1104 CTC penetrators failed
4. USS Columbia (SSN 771)
   - Initial Failures: 222 prior to replacement
   - Replacement: 280 bad CTCs replaced
   - Current Status: 56 of 1104 CTC penetrators failed
5. USS Cheyenne (SSN 773)
   - Initial Failures: 27 prior to replacement
   - Replacement: 552 CTCs replaced
   - Current Status: 35 of 1104 CTC penetrators failed

6. I will verify the numbers above with STSCS Winsko to insure they are correct as well as research the work done on the USS Charlotte (SSN 776) to correct the CTC penetrator problems onboard this platform.

CSS-1
290 bad going in
SRA - repl. 552
out of dock - 3 new ones bad

Very Respectively,

LCDR D.W. Alldridge

PATUZYUW RULSSEA0010 0451202-UUUU--RUHEMDI RHHMHAA RUHEMDZ.
ZNR UUUUU ZUI RUCOMCB7476 0452046
P 141202Z FEB 01 ZYB PSN 366297E33
FM COMNAVSEASYSCOM WASHINGTON DC//92T//
TO RHHMDBA/COMSUBPAC PEARL HARBOR HI//N4//
RUHEMCR/NAVSHIPYD AND IMF PEARL HARBOR HI//00/240/300/1200//
INFO RUHEMDI/COMSUBRON ONE//00/N4//
RUHEMDZ/NSSC PEARL HARBOR HI//00/N4//
RULSSEA/COMNAVSEASYSCOM WASHINGTON DC//392/92T/05/08//
RHHMHAA/CINCPACFLT PEARL HARBOR HI//N43//
RHHMHBA/CINCPACFLT PEARL HARBOR HI//N43//
RUCBKMC/COMSUBLANT NORFOLK VA//N4//
RHHMDCV/USS GREENEVILLE
BT
UNCLAS //N04790//
MSGID/GENADMIN/NAVSEA 92T11A//
SUBJ/USS GREENEVILLE POST COLLISION SHIP INSPECTIONS//
REF/A/DOC/E-MAIL/11FEB01//
REF/B/DOC/NAVSEA 0924-LP-064-8010/DEC00//
REF/C/DWG/NAVSEA DWG 203-6293336//
REF/D/DOC/NAVSEA S9245-AR-TSM-010/31MAR97//
REF/E/DOC/MS 2430-081-022/16JAN98//
REF/F/DOC/NSTM 243/JAN99//
REF/G/TEL/PHONCON/13FEB01//
REF/H/DOC/RLAR 7664/08SEP97//
REF/I/DOC/MS 5660-081-026/17DEC99//
REF/J/DOC/MS 5660-081-026/19FEB99//
NARR/REF A IS E-MAIL REPORT OF DIVER'S INSPECTION FROM E. BAQUIRO (PHNS) TO F. WHARTON (92T121). REF B IS SSN 688 CLASS UNRESTRICTED OPERATION MAINTENANCE CARD (URO MRC) PROGRAM CHANGE 110. REF C IS SSN 688 CLASS SUBMARINE MOD 25 MAIN SHAFTING ALIGNMENT DATA. REF D IS TECHNICAL MANUAL MARINE PROPELLER INSPECTION, REPAIRS AND CERTIFICATION MANUAL. REF E IS AFT STERN TUBE BEARING MAINTENANCE STANDARD. REF F IS PROPULSION SHAFTING NAVAL SHIP'S TECHNICAL MANUAL. REF G IS PHONCON BETWEEN R. KURASHIGE (PHNSY) AND M. BABICKI (NAVSEA 92T315). REF H IS DETERMINATION OF RUDDER AND STERN PLANE SPLAY ANGLE REVERSE LIAISON ASSISTANCE REQUEST. REF I IS INSPECT-REPAIR EXTERNAL PARTS OF STEERING GEAR MAINTENANCE STANDARD. REF J IS INSPECT-REPAIR EXTERNAL PARTS OF STERN DIVING GEAR MAINTENANCE STANDARD.//
POC/STEVE SCHULZE/TECHNICAL DIRECTOR/NAVSEA CODE 92TB/TEL: (202)781-1171//
RMKS/1. BASED ON PRELIMINARY HULL INSPECTION REPORT PROVIDED PER REF A FOLLOWING THE 09 FEB 2001 GREENEVILLE COLLISION AT SEA, NAVSEA 92T RECOMMENDS THE FOLLOWING DETAILED INSPECTIONS:

A. HULL STRUCTURES:

(1) VISUALLY INSPECT THE PORT PRESSURE HULL PLATING FRS 40-65 FOR DEFORMATION, GOUGES, AND CRACK LIKE INDICATIONS SIMILAR TO URO 3 OF REF B. UTILIZE BATTEN FAIRNESS CHECKS TO IDENTIFY AND MEASURE DISHED-IN AREAS. FRAME CIRCULARITY MEASUREMENTS MAY BE REQUIRED.

(2) MT INSPECT PRESSURE HULL BUTT WELDS IN THE AREA OF COLLISION AND 2 FEET BEYOND.

(3) UT INSPECT THE HULL FRAME TO SHELL WELDS IN THE AREA OF COLLISION. ADDITIONAL UT OF KNOWN DISCONTINUITIES PER URO 5 OF REF B MAY BE REQUIRED.

(4) VISUALLY INSPECT THE STERN STRUCTURE (MUD TANK, MBT 5) FOR DEFORMATION, GOUGES, AND CRACK LIKE INDICATIONS SIMILAR TO URO 3 OF

ENCLOSURE (~~15~~ 27)

REF B.

B. PROPULSION TRAIN:

(1) WHILE STILL WATERBORNE, ATTEMPT TO PLACE FORWARD SHAFT SEALS IN SERVICE WHILE ON TURNING GEAR AND RECORD SHAFT SEAL LEAKAGE RATE.

(2) CONDUCT BEARING REACTIONS PRIOR TO DOCKING AND AGAIN IN DRYDOCK PRIOR TO COMMENCEMENT OF ANY WORK IAW REF C. DRYDOCK REACTIONS CAN BE TAKEN USING DEAD WEIGHT VICE PROPELLER.

(3) REMOVE PROPELLER AND CONDUCT FULL VISUAL INSPECTION IAW REF D.

(4) CONDUCT VISUAL INSPECTION OF THE AFT STERN TUBE BEARING AND MEASURE AFT STERN TUBE BEARING CLEARANCES IAW PARA 1.E (1) OF REF E.

(5) CONDUCT SHAFT TAPER RUNOUT USING SECT 1.1.5 OF REF F FOR GUIDELINES ON SHAFT TAPER RUNOUT CRITERIA. RUNOUT SHOULD BE TAKEN AT FOLLOWING LOCATIONS: INBOARD FORWARD OF THE SHAFT SEALS ON THE BEARING SLEEVE, ON THE AFT PORTION OF THE AFT STERN TUBE BEARING, AND THE FORWARD END OF THE AFT STERN TUBE BEARING.

(6) IF BEARING REACTIONS, STERN TUBE CLEARANCES, SHAFT RUNOUT READINGS OR VISUAL INSPECTIONS RESULT IN SHAFT REMOVAL, A MAIN PROPULSION SHAFT OPTICAL BEARING ALIGNMENT SHOULD BE CONDUCTED.

C. CONTROL SURFACES: BASED ON REPORTED CONTACT BETWEEN RUDDER AND HULL DISCUSSED IN REF G, RECOMMEND MINIMAL STERN PLANES OR RUDDER OPERATIONS UNTIL DRYDOCK INSPECTIONS ARE COMPLETED TO REDUCE RISK OF FURTHER DAMAGE. ONCE IN DRYDOCK, RECOMMEND CONDUCTING THE FOLLOWING INSPECTIONS IN THE SEQUENCE PROVIDED BELOW IN ORDER TO ASSESS MATERIAL CONDITION:

(1) VISUALLY INSPECT ALL RUDDER AND STERN PLANE COMPONENTS FOR EVIDENCE OF CONTACT AND/OR RUBBING, RECORD FINDINGS. ASSESS EVIDENCE AND REMOVE CONTACT POTENTIAL TO FACILITATE LOCAL MANUAL OPERATION OF BOTH RUDDER AND STERN PLANES.

(2) OPERATE RUDDER AND STERN PLANES IN LOCAL MANUAL CONTROL AND VISUALLY INSPECT ALL COMPONENTS FOR BINDING. RECORD DIRECTION AND ANGLE OF ANY BINDING AND RECORD OPERATIONAL PRESSURES.

(3) MEASURE CLEARANCE BETWEEN UPPER RUDDER AND THE TOP OF THE UPPER RUDDER POST AT THREE POSITIONS: ONE AT STOCK CENTER AND MAXIMUM LOCATION FORWARD AND AFT ON BOTH SIDES OF RUDDER. NOTE THAT THE RUDDER SKIRT PREVENTS FULL ACCESS AROUND STOCK. MEASUREMENTS OF THIS CLEARANCE SHOULD BE TAKEN AT EACH OF THE FOLLOWING POSITIONS OF THE RUDDER: RIGHT 35 DEGREES, RIGHT 25, RIGHT 15, RIGHT 5, ZERO, LEFT 5, LEFT 15, LEFT 25 AND LEFT 35. RECORD ALL MEASUREMENTS.

(4) MEASURE CLEARANCE BETWEEN ANTI-LIFT RING AND LOWER SIDE OF UPPER RUDDER POST AT TWELVE POSITIONS (EVERY 30 DEGREES). MEASUREMENTS SHALL BE TAKEN WITH RUDDER AT RIGHT 35 DEGREES, RIGHT 25, RIGHT 15, RIGHT 5, ZERO, LEFT 5, LEFT 15, LEFT 25 AND LEFT 35. RECORD ALL MEASUREMENTS.

(5) REMOVE ANTI-LIFT RING, MEASURE CLEARANCE BETWEEN STOCK AND LOWER SIDE OF UPPER RUDDER POST AT TWELVE POSITIONS (EVERY 30 DEGREES). MEASUREMENT SHALL BE TAKEN AT EACH OF THE FOLLOWING POSITIONS OF THE RUDDER: RIGHT 35 DEGREES, RIGHT 25, RIGHT 15, RIGHT 5, ZERO, LEFT 5, LEFT 15, LEFT 25 AND LEFT 35. RECORD ALL MEASUREMENTS.

(6) CLEAN OUT UPPER RUDDER POST TO FACILITATE BOROSCOPE INSPECTION OF UPPER RUDDER BEARING.

(7) VERIFY TRAILING EDGE OF UPPER RUDDER IS STRAIGHT USING SUITABLE MEANS.

(8) MEASURE RUDDER AND STERN PLANE SPLAY ANGLES IAW REF H OR EQUIVALENT.

(9) MEASURE RUDDER STOCK BEARINGS CLEARANCES IAW REF I.

(10) INSPECT STERN PLANES IAW REF J.

(11) ASSESS INFORMATION COLLECTED TO DETERMINE IF ANY FURTHER INSPECTIONS, DISASSEMBLY AND/OR REPAIRS ARE REQUIRED TO EITHER CONTROL SURFACE.

(12) CONDUCT OPERATIONAL INSPECTION OF RUDDER PER MRC 7CCL OF MIP A-001. CONDUCT OPERATIONAL INSPECTION OF STERN PLANES PER URO 16 OF REF B.

2. REQUEST ALL INSPECTION RESULTS BE FORWARDED TO NAVSEA 92T.

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PSN Section #1 366297

PSN Section #2 366300

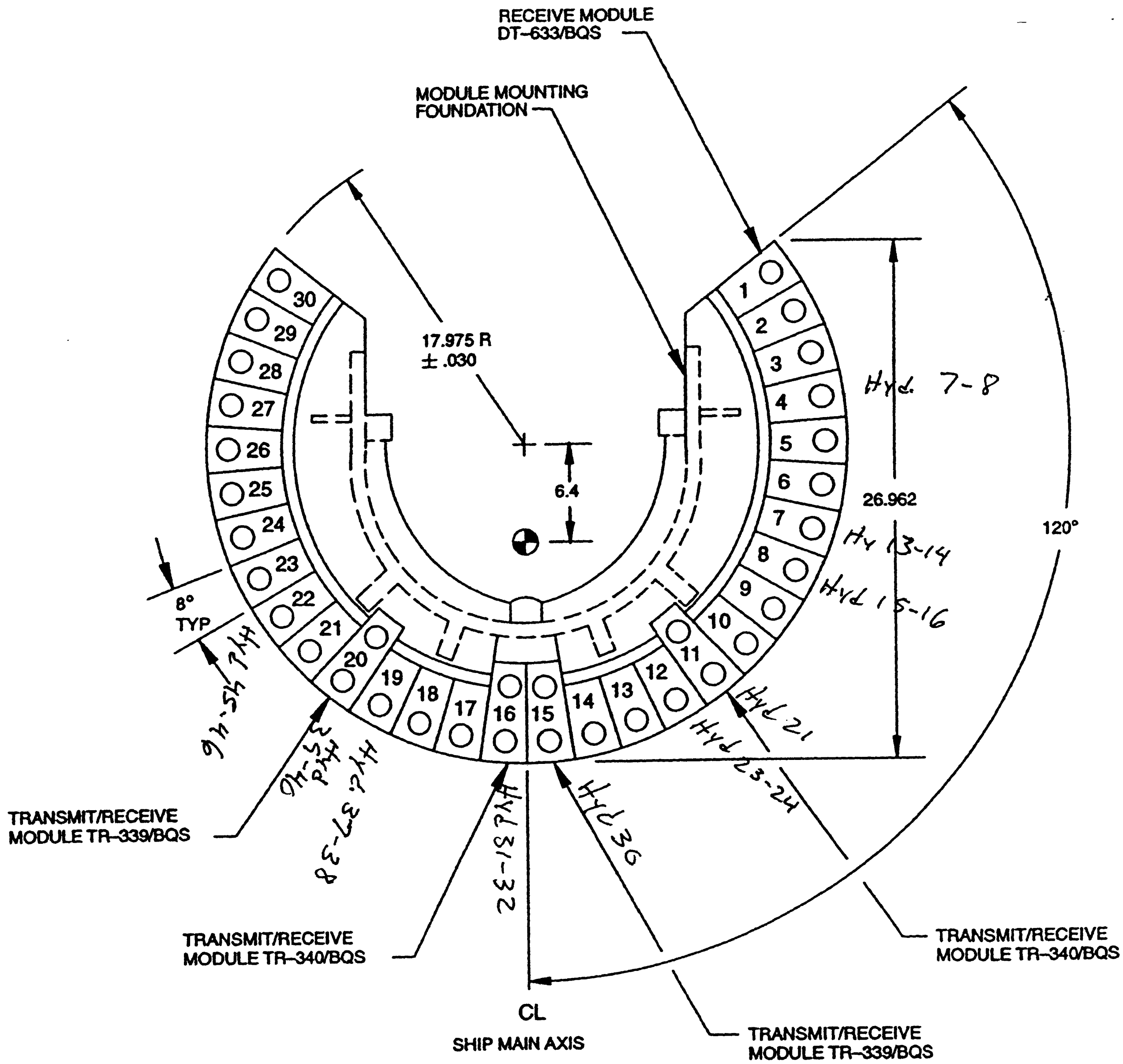
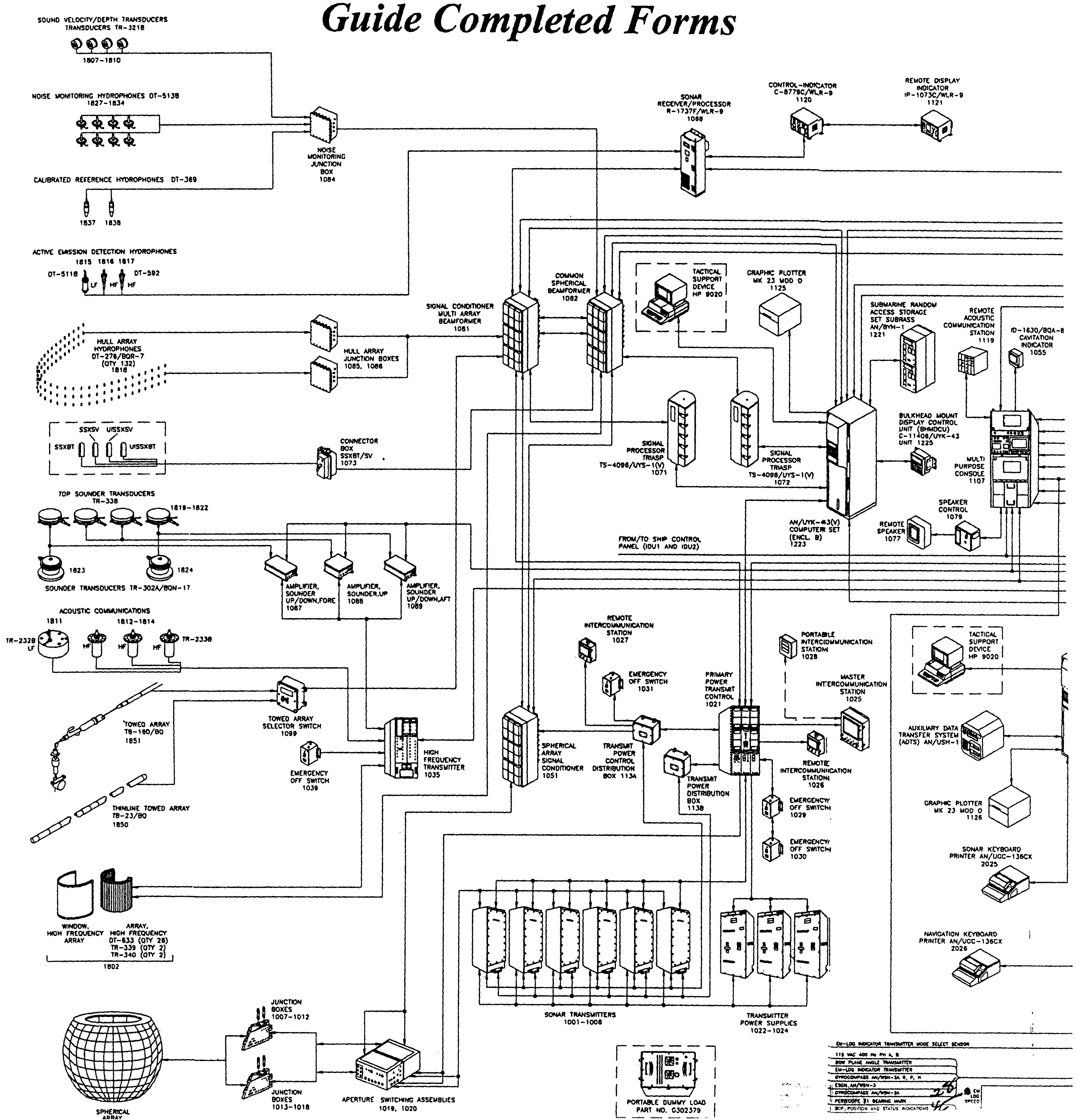


FIGURE 2-9. HIGH FREQUENCY ARRAY DIMENSIONS DIAGRAM

AN/BSY V) Trouble-Shooting Tracking Guide Completed Forms



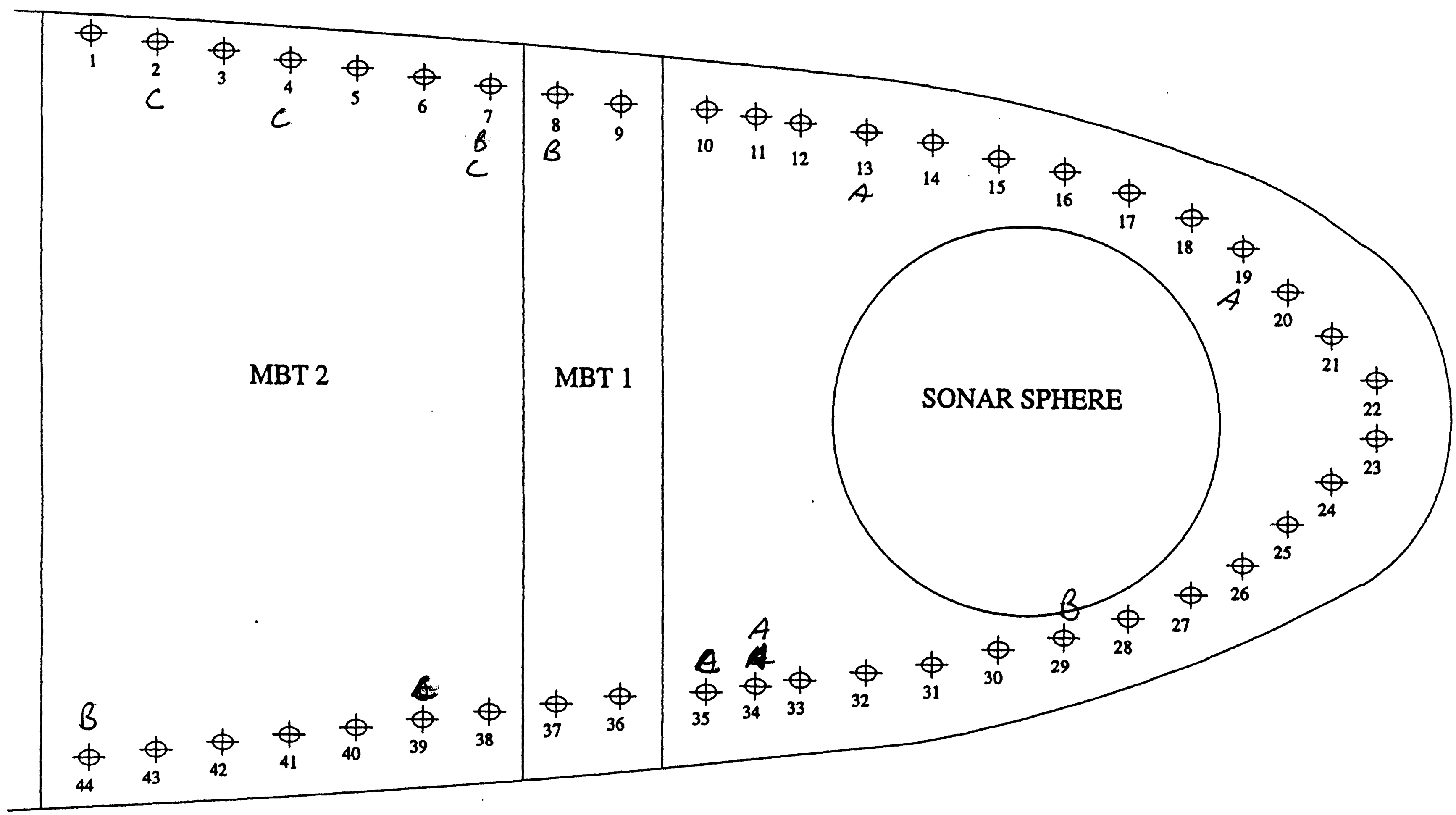


FIGURE 8-1. UNIT 1818 (DT-276) HULL ARRAY STAVE POSITIONS

28

Enclosure 29. Chart 19340 marked with operating areas and shipping lanes (2 pgs) classified and not releasable under Exemption b-1.

Section 2

Navigation

2-1 Detailed Information

General

The geographic and topographic descriptions and related navigational factors including the Pearl Harbor and Kaneohe Bay Naval Defensive Sea Areas (NDSAs), Demarcation Line, seismic sea waves (tidal waves) and warning system, explosives anchorage, and danger area in the approaches to Pearl Harbor, Oahu, Hawaii, are described in detail in U.S. Coast Pilot 7.

The navigational information herein supplements the U.S. Coast Pilot and is primarily for naval ships.

2-2 Approaches

Coastline

Between Diamond Head and Barbers Point, the coast is fringed with an extensive coral reef over which the sea usually breaks. The coastal fringing reef extends about 1 mile offshore on each side of the entrance to Pearl Harbor. The 10 fathom curve extends about 2 miles southward of Keahi Point.

Approach Point

When approaching from eastward, ships should pass not less than three miles off Diamond Head Light, then steer a course for the Approach Point. When approaching from westward, Barbers Point should be passed not less than three miles off and course set for Approach Point. Regardless of the direction of approach, all ships must pass through Approach Point PAPA HOTEL (21°16'06"N., 157°56'23"W.). (See Charts 19357, 19364, 19366 (DS), 19369, and Figure 12.) All charts are WGS 84 survey. This position is about 2 miles SE of the entrance buoys and is not marked by any navigational aid. (See Charts 19357, 19369, and Figure 12.)

Landmarks

Approaching the entrance of Pearl Harbor from eastward, the dome-shaped tower on the Ala Moana Building (21°17'34.3"N., 157°50'35.0"W) is conspicuous. Blue lights are shown from the tower which is about 315 feet high. (See Chart 19364.)

There are many other prominent features in and around Pearl Harbor. (See Chart and Figure 12.)

Ocean Currents

Ocean currents in the vicinity of Hawaiian Islands are variable. Although they are generally influenced by the speed and direction of the wind, their relation to the wind is complex. There have been reports of strong northeastward currents setting against the prevailing trade winds. The prevailing currents off Pearl Harbor and Honolulu are westerly as shown in Figure 13.

Two cyclonic eddies usually strongest during the summer months and sometime nonexistent in winter, appear in the lee of the Hawaiian Island. The northernmost of the two eddies is centered south of Oahu Island. In the vicinity of Honolulu, observed currents of about 1.5 to 3 knots setting westward have been associated with this eddy. Off Barbers Point to the westward of Pearl Harbor, currents up to 0.8 kno have been measured, and greater velocities have been reported.

A dangerous westerly set may be experienced in the vicinity of the entrance of the Pearl Harbor Channel.

Low pressure systems passing in the vicinity of the Hawaiian Islands, particularly during winter months, will cause southerly to westerly winds along the normally leeward shores of the islands. These winds may cause the currents off the southern coasts to reverse and flow eastward.

Tidal Currents

The tidal currents in the approaches to Pearl Harbor are usually semidiurnal, but the two flood and ebb currents per day often are unequal in speed and probable direction. The tidal current generally floods westward offshore at Honolulu, and into river and harbor entrances. About 2 miles south-southwestward of the entrance to Pearl Harbor, currents have been observed to flood 060° and ebb 191°, with maximum strengths of 0.6 knot. Such speeds are probably the maximum due to tidal influence that may occur in the approaches. Generally, tidal current velocity in the approaches will be less than about 0.3 knot.

Bottom Currents

Since surface tidal currents are generally negligible throughout the Pearl Harbor approaches, tidal currents along the bottom are also weak. It is possible that the subsurface current of the general circulation may reach 0.5 knot setting westward.

If tsunamis are from the south, bottom currents associated with a 10 foot wave have been calculated to reach 1.9 knots in 30 feet of water and, 1.2 knots in 60 feet of water.

Pilotage

Ships are generally boarded at Hospital Point. Pilotage is not compulsory for U.S. Navy Ships. However, it is recommended that pilots be used by ships larger than destroyer types. Use of a pilot is strongly encouraged when using more than one tug. Pilotage should be requested in the LOGREQ.

Pilot Boarding Ladder

Any ladder being provided for boarding or debarking by harbor pilots will be configured in accordance with Title 46, Code of Federal Regulation (CFR) subpart 163.003-Pilot ladder, and constructed per NAVSEA 804-5000900 Rev. A.

Tugs

Tugs are available and service can be arranged through the NAVSTA, Pearl Harbor Port Services Officer (PSO) Tugs should be requested by LOGREQ when appropriate. Outside normal working hours a duty tug is normally available on a 30 minute notice. If a second tug is requested outside normal working hours a two hour notice is required, and a third tug requires a 12-hours notice.

2-3 Entrance

Defensive Sea Area

All waters in Pearl Harbor, as well as the area in and about the entrance channel extending three miles south from Ahua Point, is blow out of the N and NW through late autumn, particularly in the S. Even off northern California, winds out of the N are only less frequent than southerlies as late as November. S move closer and occasionally break through the protective barrier in November. In offshore northern California waters, they are responsible for about 3 to 5 gale days per month, and for seas of 12 feet (3.7 m) or more, 6 to 10 percent of the time. They also dump rain up to 10 percent of the time. Weather generally improves to the S, where rain falls as little as 3 percent of the time. Gales occur on about 2 days or less. Seas of 12 feet (3.7 m) or more occur about 8 percent of the time in central waters, and about 1 percent in the S. Temperatures change slowly over offshore waters. In October, they frequently run in the fifties (10.6° to 15.0°C) in the N, and in the sixties (16.1° to 20.6°C) to the S. Temperatures drop just a few degrees in November.

(108) Fog continues to be the most frequent navigational weather hazards in the waters of offshore northern and central California. Fog reduces visibilities to below 0.5 mile (0.9 km) on about 5 to 7 days during October, the worst month. Fog and haze are reported about 15 to 20 percent of the time, except off Los Angeles, where they occur about 40 percent of the time.

(109) **Routes.**–The route along the California-Oregon-Washington coast frequently must be navigated in thick weather. Most of the courses are long, and the effect of currents is uncertain.

(110) **San Diego to Strait of Juan de Fuca.**–Vessels can proceed on rhumb lines through the following positions:

(111) 32°37'N., 117°16'W.; off San Diego.

(112) Thence to the Traffic Separation Scheme off San Pedro Bay, then follow the Traffic Separation Scheme between Point Fe nd Point Conception.

(1 °33'N., 120°42'W.; off Point Arguello.

(114) 37°38'N., 123°12'W.; off Farallon Islands (San Francisco).

(115) 38°55'N., 123°50'W.; off Point Arena.

(116) 40°26'N., 124°32'W.; off Blunts Reef.

(117) 42°50'N., 124°44'W.; off Cape Blanco.

(118) 46°11'N., 124°12'W.; off Columbia River.

(119) 48°10'N., 124°52'W.; off Umatilla Reef.

(120) 48°26'N., 124°47'W.; off Cape Flattery.

(121) **Caution:** Route W of Farallon Islands crosses San Francisco-Honolulu and other Pacific courses of vessels using the San Francisco Traffic Separation Scheme.

(122) **San Diego to San Francisco.**–Vessels can follow San Diego-Strait of Juan de Fuca route to position off Point Arguello, thence rhumb lines through the following positions:

(123) 36°17'N., 121°57'W.; off Point Sur.

(124) 37°10'N., 122°26'W.; off Pigeon Point.

(125) Thence by prescribed San Francisco Traffic Separation Scheme route to vicinity of San Francisco Approach Lighted Horn Buoy SF.

(126) **San Francisco to Strait of Juan de Fuca.**–Follow prescribed San Francisco Traffic Separation Scheme route to a position off Point Reyes, thence to Point Arena and other positions on the San Diego-Strait of Juan de Fuca route.

(127) **Caution.**–Strict adherence to tracks through positions listed above could result in collision of meeting vessels. It is suggested that southbound vessels shape courses through positions 1 le off the mainland.

(128) **Diego to Panama.**–Proceed on rhumb lines through following positions:

(129) 32°38'N., 117°13'W.

(130) 28°00'N., 116°00'W.

(131) 24°40'N., 112°30'W.

(132) 20°00'N., 107°30'W.

(133) 07°05'N., 81°45'W.

(134) **San Diego to Honolulu.**–Rhumb line from 32°37'N., 117°16'W., to 21°14'N., 157°39'W.

(135) **Los Angeles to Honolulu.**–Follow the Traffic Separation Scheme route through the Gulf of Santa Catalina, thence proceed on rhumb lines through the following positions:

(136) 32°48'N., 118°16'W.

(137) 21°14'N., 157°39'W.

(138) **San Francisco to Honolulu.**–Follow prescribed San Francisco Traffic Separation Scheme route to a position S of Farallon Islands, thence rhumb line to

(139) 21°14'N., 157°39'W.

(140) **Strait of Juan de Fuca to Honolulu.**–Great circle from

(141) 48°26'N., 124°47'W., to

(142) 21°14'N., 157°39'W.

(143) **Strait of Juan de Fuca to Unimak Pass.**–Great circle from

(144) 48°31'N., 125°00'W., to

(145) 54°00'N., 163°00'W.; thence on rhumb line to

(146) 54°20'N., 164°45'W.

(147) **Principal ports.**–The principal deep-draft commercial ports within the area of this Coast Pilot are: San Diego, Long Beach, Los Angeles, San Francisco, Oakland, Richmond, Stockton, Humboldt Bay, Coos Bay, Portland, Vancouver, Grays Harbor, Seattle, Tacoma, and Honolulu.

(148) Other ports are Port Hueneme, Port San Luis, Redwood City, Sacramento, Astoria, Longview, Port Angeles, Anacortes, Bellingham, Olympia, and Hilo.

(149) **Pilotage, general.**–In the area covered by this Coast Pilot, pilotage, with a few exceptions, is compulsory for all foreign vessels and for U.S. vessels under register in the foreign trade. It is optional for U.S. vessels in the coastwise trade, provided they are under the control and direction of a pilot duly licensed by Federal law for the waters which that vessel travels.

(150) Only at San Francisco do pilot boats cruise on station continuously. At the other ports the pilots must be notified in advance in order for the pilot boat to meet the vessel at the proper time. Most of the pilot boats and stations may be contacted by radio; though ships' agents normally arrange for pilots, a vessel may notify the pilot station of its estimated time of arrival by radio. Specific information is given in the description of the various ports.

(151) **Towage.**–Tugs of various sizes are available at all the deep-draft ports. Arrangements for their use are usually made by the ship's agent, but in some cases may be made from the vessel by radio. For further information, refer to the description of the port.

(152) **Vessel Arrival Inspections.**–Quarantine, customs, immigration, and agricultural quarantine officials are stationed in most major U.S. ports. (See appendix for addresses.) Vessels subject to such inspections generally make arrangements in advance through ships' agents. Unless otherwise directed, officials usually board vessels at their berths.

with a slight deflection of the surface winds away from the high pressure, result in the NE trades that are the dominant winds of the area.

(62) The trade-wind influence is dominant in all seasons throughout the greater part of all the islands. In some local areas, winds deviate from the general pattern because of topography. In coastal areas where mountains to the E project high above sea level, as they do in the kona districts of the Island of Hawaii, the trades are cut off, resulting in prevalent SW winds with land and sea breezes in evidence. Such effects may be rather general in some areas and extremely local in others.

(63) The Hawaiian Islands lie on the extremities of both the Western North Pacific typhoon area and the Eastern North Pacific hurricane area. Therefore, a tropical cyclone from either region is rare. **Typhoons** can form in any month, but they rarely cross 180°; when they do they are usually extratropical and well N of the islands. It is not impossible, but highly improbable, that a typhoon will move through the Hawaiian Islands.

(64) It is more probable that an Eastern North Pacific hurricane would hit the islands. These storms, prevalent from May through November, originate from the North American coast W between 10°N and 20°N. Most hurricanes either recurve or dissipate before reaching the Hawaiian Islands. August is the most favorable month for one of these storms to reach the area, although they have occurred from July through November. Since 1842 at least six storms have hit the Big Island. However, all six storms were in the dissipation stage and no major damage was reported.

(65) It is a different case however, for the western islands especially Kauai. Since 1842, Kauai has had a direct impact from a northeast Pacific hurricane at least four times. Perhaps the most noteworthy storms were Hurricane Dot on August 7, 1959. Dot was a minimal hurricane with only 75-knot winds. Hurricane Iniki, with maximum winds estimated at 125 knots and gusts estimated at 150 knots slammed into Kauai early on September 12, 1992. Damage was extensive throughout Kauai. Damage from the ocean was heaviest along the south shore of Kauai and affected shoreline hotels and condominiums. Wind damage was extremely heavy throughout Kauai, as many houses or buildings were flattened or lost their roofs. Iniki left 14,350 damaged or destroyed homes on the island. Electric and telephone services were lost throughout the island and only 20% of the power had been restored four weeks after the event. Crop damage was extensive, especially to fruit trees and sugar cane. The monetary value of the damage caused by Iniki on Kauai was estimated at $1.8 billion. Six deaths were connected to the storm.

(66) The word "kona" is of Polynesian origin and means leeward. It refers to the S winds and accompanying weather on the normally leeward slopes of the principal Hawaiian Islands which, because of the wind shift, have temporarily become the windward slopes.

(67) The konas, which occur most frequently during October through April, provide the major climatic variations of the Hawaiian Islands. During these storms, heavy rainfall and cloudiness can be expected on the lee sides of coasts and slopes, which, under the usual wind pattern, receive less cloudiness and may have almost no rain. Near gales may occur, especially near points where the air tends to funnel into sharp mountain passes near the coasts. At such times leeward anchorages may become unsafe for smaller craft.

(68) The complicated rainfall pattern over the islands results chiefly from the effects of the rugged terrain on the persistent trade winds. Frequent and heavy showers fall almost daily on windward and upland areas, while rains of sufficient intensity and duration to cause more than temporary inconvenience are infrequent over the lower sections of leeward areas.

(69) In the districts where the trade winds are dominant, rains are decidedly heavier at night than during the day. This applies generally to the greater part of the islands. Daytime showers, usually light, often occur while the sun continues to shine.

(70) Considerably more rain falls from November through April over the islands as a whole than from May through October. It is not unusual for an entire summer month to go by without measurable rain falling at some points on the Maui isthmus; at times considerably longer dry periods may occur in that locality.

(71) Elevation is the major control factor in determining temperatures, although location, whether in a leeward or windward position, is also a noticeable factor. The highest temperatures reached during the day in leeward districts are usually higher than those attained in windward areas. The daily range is also greater over leeward districts where, because of less cloudiness, the maximum temperatures are higher and the minimum temperatures usually lower.

(72) August and September are the warmest months, and January and February are the coldest. At Honolulu there is an average monthly range between a low of 73.0°F (22.8°C) in January and February, and a high of 81.3°F (27.4°C) in August. The extreme range of temperature at Honolulu for the 46-year period of record is from a low of 52°F for January 1969, to a high of 95°F recorded in September 1994. This spread of only 43°F (24°C) between the extreme high and extreme low temperatures is small when compared with ranges at Pacific coast ports.

(73) All coastal areas are subject to the relatively high humidities associated with a marine climate. Humidities, however, vary considerably, with high percentages over and near the windward slopes to low percentages on the leeward sides of the higher elevations.

(74) At Honolulu the normally warm months of August and September are usually comfortable because of the persistency of the NE trades which bring moderate humidities. Unpleasant weather is more likely later during the autumn or early winter when the trades may diminish and give way to S winds. During these periods known locally as "kona weather" ("kona storms" when stormy), the humidity may become oppressively high.

(75) **Routes.**–Between the islands, proceed on rhumb lines as direct as safe navigation permits.

(76) **Honolulu to Panama.**–Rhumb lines through 21°14'N., 157°39'W., and 21°18'N., 157°00'W.; thence great circle to 8°40'N., 88°00'W., off shoals reported S of Guardian Bank; thence rhumb lines through 7°05'N., 81°45'W.

(77) **Honolulu to San Diego, Los Angeles, San Francisco,** and **Strait of Juan de Fuca.**–(See routes in chapter 3.)

(78) **Honolulu to Anchorage.**–Rhumb lines through 21°19'N., 157°36'W., and 59°00'N., 151°20'W.

(79) **Loran and Radar.**–There is no Loran coverage in the Hawaiian Island chain. Most mariners rely on a combination of visual and radar piloting for interisland navigation. It is reported that landfall at a distance of 20 to 30 miles is not uncommon. The generally high, rugged coastline of the islands provide good and well-defined radar returns; some navigators have reported radar contact at 40 miles.

(80) **Pilotage, Hawaii, General.**–Pilotage is compulsory for all foreign vessels and for U.S. vessels under register in the for-

Enclosure 31. Qualitative Assessment of Active Sonar Utilization for Searching and Localization (2 pgs) classified and not releasable under Exemption b-1.